REMARKS/ARGUMENTS

Applicants amended paragraphs [0022] and [0031] to correct minor errors and to update the reference to include the patent application serial number.

Applicants submit herewith a replacement drawing sheet amending FIG. 11 to include the "Prior Art" label as requested by the Examiner on pg. 2 of the Office Action.

Applicants amended claim 22 to overcome the Examiner's objection thereto on pg. 3 of the Office Action to make claim 22 a system claim dependent on independent system claim 15.

1. The Amended Claims Comply With 35 U.S.C. §112, par. 2

The Examiner rejected claims 7, 20, and 34 on the grounds that the language "undo" is indefinite. (Office Action, pg. 3) Applicants amended these claims to clarify that the operation is to reverse the copying of the slave storage unit data from the remote storage to the remote backup storage and return to a previous point-in-time copy. These added requirements are disclosed at FIG. 5, block 136 and pg. 15, lines 4-12 of the Application. Applicants submit that these amendments overcome this rejection.

Applicants amended claims 10, 23, and 37 to provide antecedent basis for the "local controllers" element in these claims to overcome the antecedent basis rejection of these claims on pg. 3 of the Office Action.

The Examiner found that claims 11, 24, and 38 are indefinite because the claims do not distinguish between the first and second data structures. (Office Actions, pgs. 3-4) Applicants amended these claims to clarify operations with respect to the first and second data structures by requiring that updates to the slave storage unit received while copying the updated data indicated in the second data structure to form the consistency group are indicated in the first data structure and that complete is transmitted to the master controller after successfully copying the data in the slave storage unit indicated in the second data structure to the remote storage. These added requirements are disclosed on at least pg. 10, para. [0024]-[0025], FIG. 6, pg. 12, para [0028] of the Application. Applicants submit that these amendments clarify the functions of the first and second data structures and, thus, overcome this rejection.

The Examiner found that claims 12, 25, and 39 are indefinite because the claim recites indicating data as not updated in response to transmitting the data to the remote storage unit. (Office Action, pg. 4) Applicants traverse this finding.

Applicants submit that this limitation is definite because it is reciting that data is indicated as not updated in response to transmitting the corresponding data to the remote storage. Thus, the act of transmitting the corresponding data to the remote storage causes control to indicate that transmitted data as not updated. Applicants submit that this limitation is clear in the indication, i.e., not updated, performed in response to transmitting the data.

Accordingly, Applicants request the Examiner to withdraw the indefiniteness rejection with respect to claims 12, 25, and 39.

The Examiner rejected claims 13, 26, and 40 as indefinite because the Examiner found it unclear how the second and third commands differ. (Office Action, pg. 4) Applicants traverse.

The second command from the master controller is received and is to cause the copying of the slave storage unit data to a remote backup. The third command is transmitted to a remote controller to actually cause the copying from the remote storage to the remote backup. Thus, the second command is an intermediate command requesting the copying, and the third command is sent to the remote controller to carry out the copying requested by the second command. Applicants submit that the roles of the second and third commands are consistent and definite.

Accordingly, Applicants request the Examiner to withdraw the indefiniteness rejection with respect to claims 13, 26, and 40.

2.   Claims 1-4, 9-11, 15-17, 23-25, 28-31, and 36-39 are Patentable Over the Cited Art

The Examiner rejected claims 1-4, 9-11, 15-17, 23-25, 38-31, and 36-39 as anticipated (35 U.S.C. §102(b)) by Micka (U.S. Patent No. 5,657,440). Applicants traverse.

Amended independent claims 1, 15, and 28 concern forming a consistency group of data, and require: providing information on a consistency group relationship indicating a plurality of slave controllers and, for each indicated slave controller, an indicated portion of a slave storage unit managed by the slave controller, wherein the slave storage controllers indicated in the consistency group transmit data from the indicated portions of their respective slave storage units consistent as of a point-in-time; transmitting a command to each slave controller in the consistency group relationship to cause each slave controller to transmit data in the portions of the slave storage unit to a remote storage in a manner that forms the consistency group; and determining whether all the slave controllers successfully transmitted the data in the portions of the slave storage units that is part of the consistency group to the remote storage.

Applicants amended these claims to require the consistency group indicates for each indicated slave controller, an indicated portion of a slave storage unit managed by the slave controller, wherein the slave storage controllers indicated in the consistency group transmit data from the indicated portions of their respective slave storage units consistent as of a point-in-time. These additional requirements are disclosed on at least pg. 6, para. [0015], pgs. 7-8, para. [0019], and pg. 3, para. [0005].

The Examiner cited col. 6, lines 7-13 of Micka with respect to the pre-amended claim limitation that now recites providing information on a consistency group relationship indicating a plurality of slave controllers and, for each indicated slave controller, an indicated portion of a slave storage unit managed by the slave controller, wherein the slave storage controllers indicated in the consistency group transmit data from the indicated portions of their respective slave storage units consistent as of a point-in-time. (Office Action, pg. 5) Applicants traverse.

The cited col. 6 mentions that to achieve copy update integrity, a determination is made of a sequence of write operations among all DASD subsystems at the primary; communication of the sequence information to the secondary; and use of the information by the secondary DASD subsystems to control the sequence of update writes across all secondary DASD. Nowhere does the cited col. 6 anywhere disclose a consistency group relationship indicating a plurality of slave controllers and for each slave an indicated portion of slave storage units, where the slave storage controllers indicated in the consistency group transmit data from their indicated portions consistent as a of a point-in-time.

Moreover, Micka concerns maintaining a sequence consistency of how operations are performed in sequence by independent subsystem. For instance, a sequence is I/O operations from DASD 1, DASD 2, then back to DASD 1. (Micka, col. 5, lines 5-33) Nowhere does the cited Micka disclose a consistency group relationship indicating slave controllers and portions of slave storage units, such that data is transmitted from the portions in the different slave storage units consistent as a point-in-time. Instead, Micka concerns controlling the sequence of writes among independent primary DASD subsystems and communication of that information to control the sequence of updates, i.e., "sequence consistent". (Micka, col. 3, lines 33-40; col. 5, lines 33-45). Applicants submit controlling the sequence of writes is different from the claim equirement of maintaining a consistency group across slave controllers and storage.

The Examiner cited col. 2, lines 67 to col. 3, line 1 of Micka as disclosing the claim requirement of transmitting a command to each slave controller in the consistency group relationship to cause each slave controller to transmit data in the portion of the slave storage unit to a remote storage in a manner that forms the consistency group. (Office Action, pg. 5) Applicants traverse.

The cited cols. 2-3 mentions that the DASD subsystems are peer coupled and that a start copy operation is initiated by a message broadcasted to all primary DASD subsystems. Although the cited cols. 2-3 discuss sending a message to all DASD subsystems, nowhere do the cited cols. 2-3 disclose that the command transmitted to each slave controller causes the slave controller to transmit data in a manner that forms the consistency group, which means consistent as of a point in time. Instead, the cited messages are used to provide "sequence-consistent" copying so that the DASDs copy their writes in sequence. This is different and does not disclose copying data to be consistent as of a point-in-time for the consistency group as claimed.

Accordingly, claims 1, 15, and 28 are patentable over the cited art because the cited Micka does not disclose all the claim requirements.

Claims 2-4, 9, 10, 16, 17, 23, -25, 29-31, 36, and 37 are patentable over the cited art because they depend from one of claims 1, 15, and 28, which are patentable over the cited art for the reasons discussed above. Moreover, the following dependent claims provide further grounds of patentability over the cited art.

Independent claims 11, 24, and 38 concern forming a consistency group, and require receiving a command from a master controller to generate a first data structure to indicate updates to a slave storage unit to form a consistency group initiated by the master controller wherein data in the slave storage unit in the consistency group is transmitted consistent as of a point-in-time; generating the first data structure in response to the command; transmitting complete to the master controller after generating the first data structure; copying updated data in the slave storage unit indicated in a second data structure to the remote storage, wherein the data is copied to form the consistency group, wherein updates to the slave storage unit received while copying the updated data indicated in the second data structure to form the consistency group are indicated in the first data structure; and transmitting complete to the master controller after successfully copying the data in the slave storage unit indicated in the second data structure to the remote storage.

Applicants amended these claims as discussed above and further added the requirements that data in the slave storage unit in the consistency group is transmitted consistent as of a point-in-time.

The Examiner cited step 104 as teaching the claim requirements of receiving a command from a master controller to generate a first data structure to indicate updates to a slave storage unit to form a consistency group initiated by the master controller wherein data in the slave storage unit in the consistency group is transmitted consistent as of a point-in-time; generating the first data structure in response to the command. (Office Action, pg. 8) Applicants traverse.

The cited step 104 in FIG. 3 mentions that individual primary subsystems provide sequence information to copy active primary subsystems. As discussed, the cited Micka concerns how to have the DASDs write in sequence. Nowhere does the cited Micka disclose a command form a master controller to generate a first data structure to indicate updates to the slave to form a consistency group so that the slave storage unit transmits data consistent as of a point-in-time. Instead, the communications from the master in the cited Micka are to have the slaves write data in sequence.

The Examiner cited step 106 in FIG. 2 with respect to the pre-amended form of the copying updated data limitation, which now recites copying updated data in the slave storage unit indicated in a second data structure to the remote storage, wherein the data is copied to form the consistency group and wherein updates to the slave storage unit received while copying the updated data indicated in the second data structure to form the consistency group are indicated in the first data structure. (Office Action, pg. 8) Applicants traverse with respect to the amended limitation.

The cited step 106 mentions that the primary subsystems communicate sequence information to the secondary. Micka mentions that for step 106 the subsystem providing the time synchronizing signal will send a checkpoint message to all primary copy-active subsystems that includes a sequence time value and sequence number incremented by one for each checkpoint message, and the subsystem receiving the checkpoint communication inserts the message in its transmission steam to the secondary subsystems. (Micka, col. 7, lines 33-38)

Nowhere does the cited step 106 anywhere disclose the claim requirements of copying updated data in the slave storage unit indicated in a second data structure to the remote storage to form the consistency group. Further, nowhere does the cited step 106 disclose that updates to the

slave storage unit received while copying the updated data indicated in the second data structure to form the consistency group are indicated in the first data structure. Nowhere does the cited step 106 anywhere disclose these operations of copying updates in the second data structure and then indicating updates in the first data structure while copying the updated data in the second data structure to form the consistency group.

Accordingly, claims 11, 24, and 38 are patentable over the cited art because the cited Micka does not disclose all the claim requirements.

Claims 25 and 39 are patentable over the cited art because they depend from one of claims 24 and 38, which are patentable over the cited art for the reasons discussed above.

3.   Claims 5, 18, and 32 are Patentable Over the Cited Art

The Examiner rejected claims 5, 18, and 32 as obvious (35 U.S.C. §103) over Micka in view of Rangan (U.S. Pub. No. 2004/0148376). Applicants traverse.

First off, claims 5, 18, and 32 are patentable over the cited art because they depend from claims 1, 15, and 28, which are patentable over the cited art for the reasons discussed above. Moreover, these claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 5, 18, and 32 recite wherein each slave controller maintains a first data structure indicating updated data in the slave storage unit, wherein the slave controller transmits data in the slave storage unit indicated in the first data structure to the remote storage, and further require transmitting a command to each slave controller to cause the slave controller to generate a second data structure to indicate any writes received to the slave storage unit during the transmittal of data in the slave storage unit indicated in the first data structure to the remote storage.

The Examiner cited para. 155 of Rangan as teaching the additional requirements of these claims. (Office Action, pg. 11) Applicants traverse.

The cited para. 155 mentions that snapshots may be used to maintain historical copies of the data structures. To keep snapshots of a file at any point in time, it is necessary to write updates to the file to a different data structure. Although he cited para. 155 mentions indicating updates in a different data structure, nowhere does the cited art, alone or in combination, teach or suggest that a master controller transmits commands to slave controllers to generate a second

data structure to indicate writes to the slave during transmittal of the data in the second data structure. There is no teaching or mention of having a master controller transmit commands to slaves to have them create a second data structure for this claimed use.

Accordingly, the additional requirements of claims 5, 18, and 32 provide further grounds of patentability over the cited art.

4.   Claims 6, 13, 19, 26, 33, and 40 are Patentable Over the Cited Art

The Examiner rejected claims 6, 13, 19, 26, 33, and 40 as obvious (35 U.S.C. §103) over Micka in view of Hart (U.S. Patent No. 6,957,221) Applicants traverse.

First off, claims 6, 13, 19, 26, 33, and 40 are patentable over the cited art because they depend from claims 1, 15, and 28, which are patentable over the cited art for the reasons discussed above. Moreover, these claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 6, 19, and 33 depend from claims 1, 15, and 28 and further require transmitting a command to each slave controller to cause each slave controller to initiate an operation to cause the data from the slave storage unit at the remote storage to be copied to a remote backup storage after determining that all the slave controllers have successfully transmitted the data in the slave storage units to the remote storage.

The Examiner cited col. 4, lines 40-49 of Hart as teaching the additional requirements of these claims. (Office Action, pg. 12) Applicants traverse.

The cited col. 4 mentions copying data from a database (D2) which receives data from (D1) to an auxiliary database (D3). Although the cited Hart discusses a further copying operation to an auxiliary or third database, nowhere does the cited Hart teach or suggest that a master controller transmits commands to slave controllers to cause the slave controllers to copy data at the remote storage to a remote storage backup after all slave controllers have transmitted data to the remote storage. Thus, nowhere does the cited Hart or other cited art teach or suggest that the copy to the third location, i.e., remote storage backup, occur after all slave controllers have transmitted their data to the second backup, i.e., remote storage. Instead, the cited Hart discusses backup from a second to third storage.

Accordingly, the additional requirements of claims 6, 19, and 33 provide further grounds of patentability over the cited art.

Claims 13, 26, and 40 depend from claims 11, 24, and 38 and further require that the command received from the master controller comprises a first command, and receiving a second command from the master controller to cause the copying of the slave storage unit data in the remote storage to a remote backup storage after transmitting the complete indicating that the slave storage unit data was successfully copied to the remote storage; and transmitting a third command to a remote controller managing the remote storage to cause the copying of the slave storage unit data in the remote storage to the remote backup storage in response to receiving the third command.

The Examiner cited the above discussed col. 4 of Hart as teaching the additional requirements of these claims. (Office Action, pgs. 12-13) Applicants traverse because nowhere does the cited col. 4 of Hart teach or suggest receiving a command from a master controller and then transmitting a third command to a remote controller to copy the slave storage unit data in the remote storage to the remote backup storage.

Accordingly, the additional requirements of claims 13, 26, and 40 provide further grounds of patentability over the cited art.

5.   Claims 7, 20, and 34 are Patentable Over the Cited Art

The Examiner rejected claims 7, 20, and 34 as obvious (35 U.S.C. §103) over Micka, Hart, and Kori (U.S. Patent No. 6,836,844). Applicants traverse.

First off, claims 7, 20, and 34 are patentable over the cited art because they depend from claims 1, 15, and 28, which are patentable over the cited art for the reasons discussed above. Moreover, these claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 7, 20, and 34 depend from claims 6, 19, and 34 and additionally require determining whether the data from the slave storage units at the remote storage were successfully copied to the backup remote storage; and transmitting a command to each slave controller whose slave storage unit data was successfully copied to the remote backup storage to reverse the copying of the slave storage unit data from the remote storage to the remote backup storage and return to a previous point-in-time copy in response to determining that the data from the slave storage units.

The Examiner cited col. 15, lines 17-21 of Kori as teaching the requirement of transmitting a command to each slave controller whose slave storage unit data was successfully copied to the remote backup storage to reverse the copying of the slave storage unit data from the remote storage to the remote backup storage and return to a previous point-in-time copy in response to determining that the data from the slave storage units. (Office Action, pgs. 14-15)

The cited col. 15 mentions that if a copy fails, the failed copy can be invalidated. Although the cited col. 15 discusses invalidating a copy, nowhere does the cited Kori or any of the other art teach that a command is transmitted to all the slave controllers to reverse a copy copying by the slaves if the data from the slave storage units were not successfully copied. Nowhere does the cited art teach or suggest reversing the copying if the slaves were not successful.

Accordingly, the additional requirements of claims 7, 20, and 34 provide further grounds of patentability over the cited art.

6.   Claims 8, 21, and 35 are Patentable Over the Cited Art

The Examiner rejected claims 8, 21, and 35 as obvious (35 U.S.C. §103) over Micka, Hart, and Cochran (U.S. Patent No. 6,907,505) Applicants traverse.

Claims 8, 21, and 35 are patentable over the cited art because they depend from claims 6, 19, and 33, which are patentable over the cited art for the reasons discussed above.

7.   Claims 14, 27, and 41 are Patentable Over the Cited Art

The Examiner rejected claims 14, 27, and 41 as obvious (35 U.S.C. §103) over Micka and Dang (U.S. Patent No. 6,718,352) Applicants traverse.

Claims 14, 27, and 41 are patentable over the cited art because they depend from claims 11, 24, and 38, which are patentable over the cited art for the reasons discussed above.

Conclusion

For all the above reasons, Applicant submits that the pending claims 1-41 are patentable over the art of record. Applicants have not added any claims. Nonetheless, should any additional fees be required, please charge Deposit Account No. 09-0466.

The attorney of record invites the Examiner to contact him at (310) 553-7977 if the

Examiner believes such contact would advance the prosecution of the case.

Dated: February 2, 2006   By:_____

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Amendments to the Drawings

The attached replacement drawing sheet includes changes to FIG. 11.

Attachment: Replacement Sheet